

REMARKS/ARGUMENTS

Claims 1-26 are pending.

Claims 1, 3-9, and 11-12 have been amended.

Claims 14-26 have been added.

Support for the amendments is found in the claims and specification, as originally filed. Specifically, support for the amendment of claim 1 can be found at page 32, lines 16-18; page 34, lines 4-8; pages 35-36, bridging paragraph; and for claim 14, at page 30, last paragraph through page 37, line 10; Table 1 at page 51. No new matter is believed to have been added.

Applicants wish to thank the Examiner for the discussion conducted on December 20, 2007. The Examiner indicated that introducing the limitation “wherein each polymer block S1, S2, and S3 comprising the vinyl aromatic hydrocarbon as monomer units is directly attached to the conjugated diene polymer block B; the polymer blocks S1, S2, and S3 do not comprise the conjugated diene polymer block B; and the conjugated diene polymer block B does not comprise the polymer blocks S1, S2, and S3 comprising the vinyl aromatic hydrocarbon as monomer units” or “wherein all monomer units are charged as pure monomers and each charge is completely polymerized before the addition of the subsequent charge” would likely overcome the prior art rejections.

Applicants respond to the objection of claims 4-13 by removing multiple dependencies, and request that the objection be withdrawn.

The rejection of claims 1-3 under 35 U.S.C. 103(a) over Moczygemba, US 5,705,569 (Moczygemba I) is traversed because Moczygemba I does not teach:

(1) selecting a block copolymer mixture comprising block copolymers satisfying the claimed molecular weight distribution, M1/M3 and M2/M3 ratios, and the claimed peak top

molecular weight, wherein all monomer units are charged as pure monomers and each charge is completely polymerized before the addition of the subsequent charge (see claim 1), or

(2) selecting the claimed block copolymer mixture, wherein each polymer block S1, S,2, and S3 comprising the vinyl aromatic hydrocarbon as monomer units is directly attached to the conjugated diene polymer block B; the polymer blocks S1, S2, and S3 do not comprise the conjugated diene polymer block B; and the conjugated diene polymer block B does not comprise the polymer blocks S1, S,2, and S3 (see claim 14).

Moczygemba I discloses a general process for obtaining a large number of block copolymers (col. 2, lines 8-27; and col. 8, lines 9-29) but specifically teaches copolymer blocks that differ from those claimed (see embodiments 1-4 in Tables 1-12 and the Examples).

As known in the art, morphology and/or physical properties of block polymers are different depending upon, e.g., molecular weight of a hard segment/soft segment, composition ratio and/or compatibility.

The block copolymers of specific embodiments 1-4 in Moczygemba I have a different structure and, therefore, different properties from that claimed because the Moczygemba I copolymers are prepared by a different method (see Tables 1-4). In embodiment 1, styrene was charged 3 times followed by charging styrene and butadiene at the same time (table 1); in embodiment 2, styrene was charged 2 times, followed by charging a mixture of styrene and butadiene, and then styrene (table 2); in embodiment 3, styrene is charged four times followed by charging butadiene (table 3); and in embodiment 4, styrene was charged 3 times followed by two charges of styrene and butadiene (table 4). However, by charging styrene and butadiene at the same time, a tapered or random structure is formed for which the glass transition temperature becomes high and further the compatibility becomes different as compared to a polybutadiene chain obtained from butadiene only.

Also in Moczygamba I, the comparison of the block polymers of embodiment 1 having a tapered or random structure with the block polymers of embodiment 3 which are not tapered (but are still different from the claimed block polymers) (see tables 1 and 3) shows that the block polymers have different properties (see tables 14-15 and 19-20).

In the present invention, block copolymers are obtained by charging styrene three times followed by charging butadiene (table 1), wherein all monomer units are charged as pure monomers and each charge is completely polymerized before the addition of the subsequent charge (pages 30-37 of the present specification). Also, each polymer block S1, S,2, and S3 comprising the vinyl aromatic hydrocarbon as monomer units is directly attached to the conjugated diene polymer block B; the polymer blocks S1, S2, and S3 do not comprise the conjugated diene polymer block B; and the conjugated diene polymer block B does not comprise the polymer blocks S1, S,2, and S3. Thus, the claimed block polymers have different structure (and therefore properties) from that specifically taught by Moczygamba.

The Examiner is of the opinion that block polymers having the claimed molecular weight distribution/ratio would be inherently produced based on the data of Table 5 of Moczygamba I. However, Table 5 describes block polymers of embodiment 1 having tapered or random structure, the compatibility of which is inferior compared to the claimed block polymers. Because the claimed and the Moczygamba I copolymers are different, it is impossible to compare the molecular weight of polystyrene chains. Therefore, the claimed property is not inherent to the Moczygamba I block polymers having different structure and characteristics.

Also, it is impossible to easily obtain the claimed block polymers from the disclosure of Moczygamba I. In the present application, the molecular weight distribution/ratios of a vinyl aromatic hydrocarbon block such as styrene within the claimed range provides excellent transparency, impact resistance and mixing properties with another thermoplastic resin (pages

1-3 of the present specification). Particularly, in the form of an injection molding, it is possible to extremely improve the impact resistance without deteriorating transparency (pages 3 and 5; the Examples).

A goal of Moczygemba I is to balance impact strength and ductility of an article prepared from the described block polymers (col. 1, lines 19-50). Further, structure of the specifically disclosed Moczygemba I block polymers is different. Also, a specific relationship regarding the molecular weight distribution/ratio and effects thereof is not disclosed by Moczygemba.

In addition, Moczygemba I does not teach that the block polymers mixture comprises 65-90% of the branched block polymers (see present claim 2) and the proportion of S1 to the total number of S1, S2, and S3 is from 2 to 30% (present claim 3).

Thus, Moczygemba I does not make the claimed block polymer obvious. Applicants request that the rejection be withdrawn.

Claims 1-3 are rejected under under 35 U.S.C. 102(b) or 35 U.S.C. 103(a) over Moczygemba, US 5,393,838, (Moczygemba II). The rejection is traversed because Moczygemba II does not teach

(1) selecting a block copolymer mixture comprising block copolymers satisfying the claimed molecular weight distribution, M1/M3 and M2/M3 ratios, and the claimed peak top molecular weight, wherein all monomer units are charged as pure monomers and each charge is completely polymerized before the addition of the subsequent charge (see claim 1), or

(2) selecting the claimed block copolymer mixture, wherein each polymer block S1, S2, and S3 comprising the vinyl aromatic hydrocarbon as monomer units is directly attached to the conjugated diene polymer block B; the polymer blocks S1, S2, and S3 do not comprise

the conjugated diene polymer block B; and the conjugated diene polymer block B does not comprise the polymer blocks S1, S2, and S3 (see claim 14).

Moczygemba II describes block polymers having at least one conjugated diene with at least one monovinylarene block and at least four random-tapered blocks (col. 2, lines 35-41) prepared by charging styrene two times followed by charging a mixture of styrene and butadiene, and then butadiene (e.g., total (i) steps, Table 1). The sequence of the Moczygemba II charging and, therefore, structure of the block polymers is different from that of the present invention. Thus, Moczygemba II does not anticipate the claimed block polymers.

Also, morphology and/or physical properties of the claimed polymers are different because the polymers have different structure. Moczygemba II teaches that the tapered copolymers provide high impact strength and environmental stress resistance (col. 1, lines 25-28). In the present application, the molecular weight distribution/ratios of a vinyl aromatic hydrocarbon block within the claimed range provides excellent transparency, impact resistance and mixing properties with another thermoplastic resin (pages 1-3 of the present specification). Moczygemba II does not describe a specific relationship regarding the molecular weight distribution/ratio and effects thereof. Moreover, it is impossible to compare the molecular weight of polystyrene chains because the copolymers described in Moczygemba II (e.g., tables 6 and 7) are different. Therefore, it is impossible to easily obtain the claimed block polymers from the disclosure of Moczygemba II.

Thus, Moczygemba II does not make the claimed block polymers obvious. Applicants request that the rejection be withdrawn.

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A Notice of Allowance for all pending claims is requested.

Respectfully submitted,

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